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ABSTRACT

This Yugoslavian study aimed to describe the ways in which mothers are (or are not) using the opportunity, created by interacting with their children on tasks which are in the child's Zone of Proximal Development (ZPD), to foster the child's metacognitive development. The underlying assumption of this study on metacognition is derived from the Vygotskian conception of development. The mechanism of metacognitive development is seen as internalization, proceeding from other-regulation or joint regulation to self-regulation. It occurs in adult-child interactions in the Zone of Proximal Development, in the course of which the adult is expected to gradually hand over metacognitive control to the child. Subjects for the study were 42 children ages 7 and 8 years, and their mothers. Metacognitive development was assessed through several methods, including a meta-memory interview (MMI), guessing game, forbidden colors game, and text underlining task (children completed these games and tasks independently and with their mothers). Complex correlations between variables related to metacognitive development and to mother-child interaction, revealed that mother-child interaction had affected the children's metacognitive development by age 7 or 8, and that features of the interaction which have the greatest impact on development can be clearly encompassed in the Vygotskian framework. Results also showed, however, that metacognitive regulation (especially planning and checking) was not made transparent for the child by the mother, leading to the conclusion that development of independent thinking is not stressed, possibly because of authoritarian cultural attitudes. (Concludes with a description of a proposed intervention program for metacognitive development. Contains 33 references.) (EV)

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HOW CAN WE AS PARENTS AND EDUCATORS FOSTER METACOGNITIVE DEVELOPMENT?

ED 403 061

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The basic impulse to research the impact of social interaction on metacognitive development comes from three sources:

1. a need for a theoretical reconsideration of metacognition from a Vygotskian perspective
2. a practical concern for metacognitive development being neglected in the schooling system in Yugoslavia and the burden of cognitive development put on the shoulders of the parents.
3. a need to anchor metacognition-fostering intervention programs both in research of metacognitive development and in thorough considerations of its cultural specificity.

Reconsidering metacognition

Although Brown, discussing the theoretical sources of metacognition (Brown,1987) highlighted four pertinent issues in psychology (verbal report as data from classical introspective psychology, executive control from cognitive psychology, self-regulation from Piaget and the transference from other-regulation to self-regulation from Vygotsky), only two of these had substantial impact on metacognitive research: the cognitive (Sternberg, 1982, 1984; Demetriou, Efklides and Platsidou, 1993) and Vygotskian (Vygotsky, 1978, 1986; Wertsch, 1979). However, a complete integration even of these two approaches was not achieved, neither on the conceptual nor on

PS 024 976

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the empirical level, which eventually contributed to the split of metacognition (Brown, 1994, Wertsch, 1994) into self-regulation and theory of mind.

In a sense this split was already built-in in the very concept of metacognition, covering a broad range of phenomena - knowledge of one's own cognitive functioning, regulation of one's own cognitive activity and experiential corollaries of this activity (Flavell and Wellman, 1977), without the explication of integrative links between them. Hence, knowledge and regulation tended to be dealt with separately and in a particularized way, and the experiential aspect of metacognition gradually faded out of the scope of metacognitive research. This state of affairs undoubtedly resulted also from methodological problems in registering and measuring metacognitive phenomena, due to the hidden and subtle character of these processes, their sensitivity to contextual variations and the ease in falsifying introspective accounts. However, as much as this particularization seems understandable from the point of view of scientific rigor, it can be considered unfortunate if one bears in mind that metacognition gained interest predominantly due to its potential heuristic value derived from its overarching nature.

Metacognition as a Vygotskian topic

Capitalizing upon the theory of Vygotsky in a more complete manner might prove fruitful in overcoming the conceptual and theoretical difficulties of metacognitive research, briefly described above. Indeed, metacognition can be considered a Vygotskian topic par excellence. Metacognitive development can be conceived as the core phenomenon of development envisioned by Vygotsky, since it involves the mastering of one's own mental processes, their voluntary control and establishing links between different functions and creating new functional systems. In this vein, Braten (1991a, b,1992) in his reconsideration of the theoretical sources of metacognition finds all four sources, identified by Brown, linked together and embedded in Vygotsky's theory.

Braten's analysis focuses predominantly on highlighting the ways in which knowledge and regulation mutually enhance each other in the course of development described by Vygotsky and reinforced by many empirical investigations later on. Hence, it is a that Braten's general conclusion one of the main conceptual problems with metacognition (the knowledge/regulation split) should have not existed at all, if the potentials of the full scope of Vygotsky's theory had been taken into account earlier on.

In addition to this fundamental benefit, two other points or implications of a Vygotskian approach should be stressed.

The experiential aspect of metacognition, although listed in the earliest definitions of metacognition (Flavell and Wellman, 1977) aside from the investigations of the "feeling of knowing" phenomenon (Nelson, et. al. 1984,

PS 024976

1986), has not gained much attention from investigators. Neither was its relation to knowledge/awareness and regulation satisfactorily resolved.

However, the theory of Vygotsky opens the possibility of a new view of the role of metacognitive experiences as well. Development is conceived by Vygotsky neither as maturation nor as learning but as a unique interplay between the natural and the cultural processes - it is the cultural framing of personal experiences. Hesitancy, confusion, doubt, not-being-sure-what-to-do-next, as well as surprise, excitement, eagerness, delight, the "aha" experience, the scale from feeling uncertainty to feeling certainty, and other "cognitive emotions" (Scheffler, 1991) and "intellectual passions" (Perkins,1992) which constitute the "soft stuff" thinking is made of, might productively enlarge the list of metacognitive experiences. Dealing with these experiences, their legitimization and building regulation and awareness upon them, so painfully lacking from the teaching process in schools (Kovac-Cerovic and Seizova, 1991), might be the main road for enhancing or even constructing metacognitive development. Moreover, in this way, metacognition is seen as becoming culturally shaped, and variations in cultural ways of regulating and being aware of one's own metal processes might become visible on the level of metacognition.

Also, meaning making, as the basic activity of the interpretive mind (Bruner, 1990) can be conceived as one of the core metacognitive processes, in the cognitive analyses embedded in planning, but in non-laboratory settings clearly distinct and recognizable.

Hence, the basic underlying assumption of this study is derived from the Vygotskian conception of development. The mechanism of metacognitive development is seen as internalization, proceeding from other-regulation or joint regulation to self-regulation, i.e. from being interpsychical toward becoming intrapsychical. The process of metacognitive development is expected to occur in adult-child interactions in the Zone of Proximal Development (ZPD; Vygotsky, 1978), in the course of which the adult is expected to gradually hand over metacognitive control to the child (Wertsch, 1978).

However, Wertsch's initial description of how metacognitive functioning is distributed in the mother-child dyad, and changed in the course of solving a task (Wertsch, 1978) has been subject to critical reexaminations. Kontos (1983) in her microanalytic study did not find enough empirical evidence to support Wertsch's conclusion of the roots of metacognition being in the mother-child interaction. On the other hand, Elbers et. al. (1992) found that Wertsch's account is understating the role of the child. When using more naturalistic situations, they found (as did others, e.g. Ignjatovic-Savic, et.al, 1988) that the child is much more active in constructing the actual nature of interaction than in the jigsaw-puzzle task used by Wertsch.

Also, descriptions of the mechanisms underlying interaction in the ZPD, condensed into different metaphors ("scaffolding", Wood, 1986; "appropriation", Rogoff, 1990; "construction Zone" Newman, Griffin and Cole, 1989; "negotiation of meanings", Wertsch, 1989) acknowledge the complexities of adult-child interaction in the ZPD, but nevertheless leave us hesitant in

respect of the actual ways in which metacognitive development is constructed through social interaction.

The purpose of this study, stated in the most general terms, was to make the necessary preliminary steps in order to approach investigations of metacognitive development and its enhancement in the course of mother-child interaction, as well as to open the road for research-based educational interventions fostering metacognitive development.

The Study

The following study aimed to describe the ways in which mothers are (or are not) using the opportunity, created by interacting with their children on tasks which are in the Zone of Proximal Development of the children to foster the child's metacognitive development. The features of this interaction which are considered most important for metacognitive development to occur are derived from the theoretical reconsideration of metacognition in the socio-cultural perspective, described above.

They are:

- handing over of metacognitive control to the child and rendering requested activities meaningful for him
- making metacognitive regulation transparent for the child (especially planning, monitoring and checking)
- promoting metacognitive awareness (using a language of thinking in interacting with the child)
- dealing with metacognitive experiences (making them possible and legitimate for the child, and building upon them appropriately, both in respect of the timing and the developmental directedness of the adult's interventions)

The actual research is dealing with mother-child interaction in situations resembling every-day activities (games and school-assignments) and targeted at the age when metacognitive development is most likely starting to unfold (7-8 years). It is embedded in a greater longitudinal project investigating mother-child interaction and its developmental effects, which was conducted 1983-93, at the Institute of Psychology in Belgrade.

Sample

The original sample for the longitudinal study consisted of 50 infants from Belgrade, stratified by gender (25 boys and 25 girls), age (9, 12, 15, 18, and 21 months) and by their mother's education (25 % elementary school, 50 % high school, 25 % college graduated). For the second visit, when the majority

of data for this study has been collected, 42 children and their mothers from the original sample were investigated (33 in first grade, 9 in their last preschool year). For the third data collection period the sample comprised 32 fourth grade and 9 third grade children.

Design

The general strategy was to analyze mother-child interaction with respect to metacognitive stimulativeness and to assess the correlations of the interactive indices with metacognitive development, intelligence and grades.

Most situations for assessing mother-child interaction and the child's metacognitive development were designed for the purposes of the present study in the second data collection period (at the children's age 7-8 years). All investigations were conducted in the child's home, and were video or audio-taped. The tapes were analyzed and coded by two independent observers for each situation (a different two for each situation).

The home visit started with situations assessing metacognitive development of the child, the mother being not present. Later on, the mothers were asked to join and help the child, and the interactive situations were administered.

The children's intelligence was tested with the New Belgrade Revision of the Binet (Milinkovic at al, 1976). Information on school-grades was gathered from the first semester of the school-year, as being more discriminative than those from the second semester.

Procedure

Metacognitive development was assessed through the following indices/situations:

Metamemory Interview (MMI). A modification of Kreutzer, Leonard and Flavell's metamemory interviewing procedure was used. The modification consisted of a slight cultural adaptation of the questions and tasks and the development of a scoring system for assessing each child's metamemoric functioning (Stanisic, 1991).

Guessing Game (GG). This game assessed the metacognitive regulation of the child's searching activity and the ease with which the child adopted an efficient searching strategy was assessed. A set of 32 cards (used for assessing concept formation by Bruner, Goodnow and Austin, 1956) were displayed in front of the child (each category in a row) and a game initiated where the child or examiner were trying to find out (within 10 guesses, followed by YES or NO answers) which of the pictures the other is thinking

of. Examiner and child alternated, there were 5 phases, 3 for assessing the child (1.-baseline, the other 2 after modeling) and two in which the examiner displayed (first tacitly, then explicitly, by turning upside down the categories of pictures for which the child said NO) the most efficient searching strategy (searching for categories instead of particular items, and keeping track of questions and narrowing down possible guesses by elimination of categories).

Forbidden Colors Game (FCG). This game was used to assess the child's aptness to use external aid as a mediator of his/her own thinking processes. It is an adaptation of Leontiev's experiment, reported by Vygotsky and Van der Veer (Vygotsky, 1978, Van der Veer, 1994). It is a verbal game containing 2 series of approximately 15 question-answer episodes. The Examiner asks questions, some of them referring to colors. In answering, the child has to follow 2 rules of the game: she must not mention the "forbidden color" named by the Examiner in advance, and must not mention any color twice during the same series of questions. In the second phase, 10 colored cards were given to the child in order to aid him in answering with greater success to the next series of questions, but without actual explanation of how, when and why to use them. The level of appropriate card usage in phase two and percentage of correct color answers were registered.

Metacognitively stimulative aspects of mother-child interaction were assessed in the following situations:

Forbidden Colors Game with Mother (FCGM). This situation constituted the third phase of the FCG when the mother (not present at phase 1 and 2) was asked to help the child to learn to use the cards in order to play better.

Guessing Game with Mother (GGM). In this situation the mothers' way of promoting the child's categorical search was assessed in a more spontaneous game then in GG (guessing the object in the room the other is thinking of).

Underlining Text (UT). This situation was introduced only to grade 1 children. The mother was asked to help the child in selecting and underlining the most important parts of a two passage text from a 2nd grade textbook.

From all these situations the following variables were extracted:

- a scale of metacognitive problems created by the mother in the course of interaction (from no problems detected, through insufficient upgrading of the child's process, not providing a mental model, not providing opportunity for the child's metacognitive experiences to occur, these experiences overruled, up to straightforwardly creating metacognitive problems for the child by confusing messages, several contrary instructions etc.) (MC NOP)
- the assessed zone of the mother's intervention (future, potential, actual, past, according to an elaboration of the concept of the ZPD in Ignjatovic-Savic, Kovac-Cerovic, Plut and Pesikan, 1988) rated for each situation separately, then combined in 2 variables: the best (Zone optimistically assessed, ZOOPT) and the worst (Zone pessimistically assessed, ZOPES)

- the mother's activity in participating (AKTM)
- the mother's directiveness (DIRM)

From the Underlining Text situation, as being the most sensitive and fruitful situation for the phenomena under the scope of the present study several additional variables were selected:

- two representative indices of the child's negotiated activity and role in the task through a) who the actual underlining agent was and how independently he/she translated the selected important part into a line with a definite starting and ending point, UAG; and b) who was the important part selecting agent, IMPAG;
- a variable tapping the meaning making aspect of metacognition through the ways mothers mediated the main feature of the task to the child, i.e. the genres in translating the "underlining the important parts of the text" request (MEDT);
- the child's participation in thinking allowed or asked for by the mother, from an explicit invitation to think with the respective straightforward use of the language of thinking to the denial of any possibility for the child of having thinking experiences while solving the task (ITH).

Results and Discussion

Indices of metacognitive development

Correlations between different tasks are shown on table 1.

Table 1. Correlations of indices of development

	Binet	MM	FCG (%+)	FCG (CARD)	GG (PH.1)
MM	.57**				
FCG (%+)	.48*	.16			
FCG (CARD)	.56*	.44	.22		
GG (PH.1)	.23	.31	.13	.53*	
GG (PH.2)	.03	.17	.19	.27	.62**

** P<0.01
* P<0.05

Most of the correlations of the different indices across these tasks are low, not significant, except for four cases:

- FCG card usage with GG strategic guessing at phase 1. (.53*), accordingly, these 2 situations are connected, but tapping somewhat different aspects of MC functioning
- FCG card usage with IQ .56*

- FCG percentage of correct answers in the first series (without cards) with IQ .48*
- MM with IQ .57**, hence MM seems to be a correlate of IQ, but clearly a different phenomenon.

According to this evidence, metacognition cannot be conceived as a homogenous phenomenon. Theoretical elaborations of metacognition do indeed approve such a finding. However, since the two included games focus on the regulative aspect of metacognition, we must conclude that even in this respect we are dealing with a set of related but not overlapping mechanisms. However, card usage seems to detect an important process, related to all other, otherwise not related variables, and in this sense it might reflect the organizing nature of metacognition.

Indices of mother-child interaction

Correlations between different interactive indices are shown in table 2.

Table 2. Correlation of interactive indices

	MCNOP	ZOOPT	ZOPES	AKTM	DIRM	UAG	IMPAG	MEDT
ZOOPT	.24							
ZOPES	-.72**	-.58*						
AKTM	-.31	.25	.03					
DIRM	-.46*	-.23	.39	.36				
UAG	.49*	.38	-.25	-.37	-.44			
IMPAG	.45	.30	-.24	-.64**	-.44	.61*		
MEDT	.46	.43	-.34	-.57*	-.32	.58*	.79**	
ITH	.75**	.36	-.53*	-.62**	-.58*	.68*	.78**	.83**

*p<.05 **p<.01

Clearly, the highest correlations have been detected between the variables derived from the same situation, UT; specifically, the way the mothers mediated the task to the child and the extent they involved them in thinking, as well as the child's active role in selecting the important parts of the text.

At the same time, the level of the child's involvement in thinking (asked for or permitted by the mother, and encompassing the use of the respective language of thinking by the mother) seems to be a focal variable of interaction, having significant negative correlations with the pessimistic appraisal of the developmental directedness of the mother's interventions (the worst of all registered types in the same dyad), her directiveness and level of activity/engagement in solving the tasks, but high positive correlations with all other variables except the optimistic appraisal of the developmental directedness of the mother's interventions (the best of all displayed interactions by the same dyad). The two indices of the child's active role in

underlining and selecting the important parts of the text (UAG and IMAG), although connected, but not overlapping, also correlate with the most important interactive indices.

The scale of metacognitive problems created by the mother (from no problems to severe problems) seems to be a crucial variable, having significant negative correlations with the ZOPES and the mother's directiveness (DIRM), but positive ones with the extent the child is engaged in underlining and the explicitness of the invitation to think received from the mother.

The mother's directiveness and activity behave in a similar way, showing either that the coding system did not succeed in disentangling them, or that active task-related involvement of the mothers has a similar detrimental effect on other aspects of interaction the unholding as has her directiveness. In any case, both activity and directiveness are negatively correlated with all other indices of interaction, except ZOPES.

ZOPES and ZOOPT although behaving clearly differently, and having a significant negative intercorrelation, do not seem mutually exclusive, which justifies the inclusion of both ways of treating the variety of developmental directedness of intervention displayed by the mothers in the course of interacting with the child on different tasks.

It has to be noted, that the variables extracted on the basis of the theoretical reconsideration of metacognition in the light of socio-cultural theory (dealing with metacognitive experiences, meaning making and the language of thinking) have been shown according to the correlational evidence to be important indices of the mother-child interaction. The more global variable, ZOPES, also seems to be sensitive to the ways mothers cope with metacognitive experiences of the children.

Interactive indices and variables of metacognitive and cognitive development

Significant correlations between interactive and developmental indices are shown on table 3.

Table 3. Correlations between interactive and developmental indices.

BINET		FCG (card)		MM		SCHOOL GRADES	
MCNOP	.48**	ZOOPT	.40*	UAG	.50*	ZOOPT-LANGUAGE	.50*
MEDT	.58**	ZOPES	-.43*	MEDT	.56*	ZOOPT-SCIENCE	.43*
ITH	.51**	(MCNOP, UAG, MEDT, ITH close				ZOOPT-GENERAL	.50*
UAG	.52**	to significance					

*p<.05
**p<.01

The most important interactive indices are found to be correlated with the BINET IQ, and, partially metamemory (which is also connected to IQ). Card usage in FCG and the school-grades collected 3 years later correlate significantly only with the most general interactive indices, the developmental directedness of the mother's interventions.

If the interactive indices focused on in this study depict stable interactive features (for additional evidence from the longitudinal study see Kovac-Cerovic, 1995), and relying on the general ideas of social constructivism found in Vygotsky's works, it can be concluded that mother-child interaction has already impacted metacognitive and hence cognitive development of the children by the age of 7-8 years.

Of special interest is the fact that, according to the present evidence, the features of interaction which have the greatest impact on development can be clearly encompassed in the Vygotskian framework as described and elaborated upon in this article. These are: making metacognitive experiences possible and legitimate for the child and building upon them (as reflected through MCNOP and ZOOPT); rendering the task meaningful for the child (as reflected through MEDT); promoting metacognitive awareness (as reflected through ITH); and handing over the control to the child (as reflected through UAG).

However, in the course of the observed interactions metacognitive regulation (especially planning and checking) was not made transparent for the child by the mother. Actually, planning and checking were virtually absent as targets of the mother-child interaction. Planning of subsequent steps was explicitly addressed only by 4 % of the mothers, and 74 % of the dyads commenced solving the task without any, even hidden or implicit planning. While 40 % of them promptly started dealing with the very task, 34 % devoted some time to negotiating each other's roles but not to selecting appropriate strategies for dealing with the task they were confronted with. Checking was completely absent in 92 % of the dyads, and only 8 % of the mothers made some ending comments like "Well, let's see what we have done..."

In general, these tentative results regarding metacognitive control are leaving the impression of the development toward an independently thinking individual not being promoted. Indeed, it might be the care that presely

planning and checking are the processes privileged for being in the control of authority of any kind. This way, metacognitive regulation remains non-transparent for the developing individual, and is virtually removed from its repertoire of activity. Whether this pattern of results lends itself to interpretation as reflecting a general cultural attitude toward children in this society (close and accepting relationship, but neither providing the necessary tools for independent individual functioning, nor requesting it) is certainly an empirical question for further investigations. But, if proved valid, this interactive pattern might be considered as a fundamental mechanism of constantly re-generating an authoritarian mode of thinking in society.

The Intervention Program

Relying on the theoretical reconceptualization of metacognition in the Vygotskian framework and on the results of the study presented, a metacognition fostering program has been developed (Kovac-Cerovic et al, 1993). This program, called "Cognition through Games", fulfills the need created by the Yugoslav schooling system disregarding all three facets of metacognitive development (experiential, regulative and reflective) and it can be considered as an intervention program aiming to alter the perpetuation of an authoritarian thinking mode in the Yugoslav society, described above.

The two most important features of the program are anchored in the theory: using social interaction as the major vehicle for constructing metacognitive development and relying on metacognitive experiences as the starting point for fostering metacognition. We consider both features to be necessary in order to circumvent possible obstacles of metacognitive training programs which arise from the fact that metacognition is subtle and hidden, easily misled by inappropriate contexts, and the training easily faked if not built upon authentic experiences of the children. Also, the choice of these features of the program is based on the analysis of the cultural specificity of metacognitive development in Yugoslavia: it relies on the children's' experiences as the best mothers in the above described study do, but builds the regulative mechanisms more thoroughly and elaborately upon these experiences than the mothers do. The program consists of a series of 27 workshops (15 for grades 1-4 and 12 for grades 5-8). The workshops are organized around diverse cognitive and social problems/topics which bear educational relevance in their own rights as well, but also a require high level of metacognitive activity from the participants. The uniting feature of all the workshops is the process embedded in their design and developed relying on basic notions of the theory of Vygotsky, specifically the constructive role of social interaction in the Zone of Proximal Development. In order to enhance metacognitive experience we provided possibilities for:

1. provoking the experience
   - the curriculum must be organized around real problems
2. making the experience meaningful
   - careful arrangement of context is essential
3 accepting the experience
   - teacher intervention and modeling is necessary
4. sharing the experience
   - group interaction is essential
5. promoting the experience
   - focusing on the Zone of Proximal Development of each child should be accomplished through group interaction, teacher intervention and meaningful problems

The steps in our workshop process encompass all these requirements.

All activities are structured into game-like cooperative group activities. The game-context is carefully designed in order to render children's activities authentic and meaningful and to provide opportunities for metacognitive experiences to occur. In the course of the workshops, these experiences are further framed and articulated by symbolic tools, i.e. expressed through movement, picture or word. In the next step, experiences are shared in group interaction and thus legitimized through acceptance by the group. Finally, the game structure calls for further elaboration - experiences are used to build up coping strategies regarding more elaborate and thorough metacognitive regulation, which are further generalized and reflected upon.

The program "Cognition through Games" has been used with refugee children through an UNHCR project, as well as in many after-school settings with elementary school children in Yugoslavia. Also, we consider this program potentially useful in many other societies where individual responsibility and independent thinking were not sufficiently fostered in the past.

Conclusion

The study described in this article dealt with the metacognitively stimulative aspects of mother-child interaction, based on a Vygotskian reconsideration of metacognition and its development.

It was shown that theoretically relevant but empirically novel aspects of interaction can be detected in the realm of mother-child interaction - specifically, dealing with metacognitive experiences, meaning making, language of thinking. Also, a tentative cultural pattern of interaction has been recognized, fostering close mother-child relationships but, neglecting metacogni-

tion, which, coupled with the impact of schooling, might be potentially detrimental for independent metacognitive functioning.

A metacognition fostering program derived from this study was outlined and its reliance on the theory of Vygotsky highlighted.

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